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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,717	10/29/2003	Francois Gonthier	546-USA	4021
26031	7590	05/27/2005	EXAMINER	
GEORGE J. PRIMAK 13480 HUNTINGTON MONTREAL, QC H8Z 1G2 CANADA			LEPISTO, RYAN A	
			ART UNIT	PAPER NUMBER
			2883	

DATE MAILED: 05/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EX

Office Action Summary

Application No.

10/694,717

Applicant(s)

GONTHIER ET AL.

Examiner

Ryan Lepisto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 13-16 is/are rejected.
- 7) ☒ Claim(s) 1, 12 and 17-20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/03, 1/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. **Claim 1** is objected to because of the following informalities: The word "centre" should be changed to the common US spelling, – center – and the word – the – should be placed between "into which" and "input end of the LACDCF the optical signal is to be transmitted;." Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-7, 9-11 and 13-16** rejected under 35 U.S.C. 103(a) as being unpatentable over **Fidric et al (US 6,434,302 B1)** (Fidric) and further in view of **White (US 2004/0197062 A1)**.

Fidric teaches an optical coupler and the implied method of forming such (Figs. 1-5) comprising a bundle of individually pre-tapered (column 5 lines 1-2) multimode fibers (MMF, 30) with either a single mode fiber (SMF, 20, column 5 lines 2-4) or another MMF (column 6 lines 10-16) that transmits a single in between a symmetric array of MMFs (30) (Fig. 5) (surrounding fibers do not affect the transmission of the center fiber, with the center fiber possibly being etched to reduce core size or expanding

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the core (in waist section, Fig. 11A, 45) column 4 lines 54-58, column 5 lines 14-19, column 9 lines 46-51), a large area core double clad fiber (LACDCF, 14) having an inner clad (Fig. 1, 14), outer clad (16) with a lower refractive index than the inner clad (column 4 lines 49-50) (Fig. 5 shows the LACDCF with the outer clad removed near the coupling region) wherein the end of the LACDCF has an end terminating with the input end of the bundle of fibers (30 with 20) so the input end of the LACDCF transmits the signal from the SMF (20), the bundle is fused at an end that couples to the LACDCF so the periphery fits up with the inner clad (14) of the LACDCF (column 5 lines 4-8) so it can be aligned and spliced with the LACDCF to preserve fundamental mode transmission from the bundle to the LACDCF (column 5, lines 16-19) (matching mode field diameter will ensure fundamental mode transmission).

Fidric does not teach expressly using a few-mode fiber (FMF) with an expanded core from a SMF in place of the SMF and therefore functioning as a mode converter.

White teaches a few-mode fiber (small mode field radius fiber) that is the structure and size (5.8-8 μm radius) as know single mode fiber and an enhanced single mode fiber (ESMF) with a radius of 8.8 μm that transmits up to 3 mode other than the fundamental mode (paragraphs 0010 and 0013) both being formed by expanding the fiber core (an therefore functions as a mode converter) where necessary.

Fidric and White are analogous art because they are from the same field of endeavor, mode coupling of different mode optical fibers.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the fibers as taught by White in the coupler as taught by Fidric

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since the fibers taught by White similar dimensions as the single mode fiber in the coupler as taught by Fidric (Fidric claims 1-4 teach the system with out specifically employing a single mode fiber in the middle so it reasonable to use any fiber with the appropriate dimensions, since the dimensions are the critical parameter, without destroying the coupler taught by Fidric.

The motivation for doing so would have been to accommodate larger cores in a single mode fiber dimensioned fiber to enable the fiber meet loss and dispersion requirements (White, paragraph 0014).

3. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fidric and White as applied to claims 1-7, 9-11 and 13-16 above, and further in view of **Weidman (US 5,664,037)**.

Fidric and White teach the coupler with the limitations described above used to reject claims 1-7, 9-11 and 13-16.

Fidric and White do not teach expressly using a dummy fiber in place of a MMF.

Weidman teaches multi-fiber coupler (Figs. 1, 5-6) using dummy fibers (49-52) in place of the symmetric array of multi-mode fibers surrounding a center fiber in the tapered coupler (column 4 lines 25-28, 37-39).

The combination of Fidric and White and the Weidman reference are analogous art because they are from the same field of endeavor, tapered fiber couplers using a symmetrical array of multi-mode fibers surrounding a center fiber for transmission.

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At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use dummy fibers in place of one or more multi-mode fibers as taught by Weidman in the coupler taught by the combination of Fidric and White since both teach a symmetric multi-mode structure and Weidman teaches an improvement on the structure taught by Fidric and White (Weidman, column 1 lines 10-67).

The motivation for doing so would have been to reduce cost and complexity by using dummy fibers that are not active and therefore do not need a core (and therefore are easier to produce and cheaper).

Allowable Subject Matter

4. **Claims 12 and 17-20** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

With regard to claims 12, 17 and 18: These claims would be allowable over the prior art of record if rewritten in independent form including all of the limitations of the base claim and any intervening claims because the latter, either alone or in combination, does not disclose nor render obvious a method of forming with a tapering structure comprising a bundle of multimode fibers surrounding a few-mode fiber with a maximum taper ratio of the equation given in claim 12, expanding a few-mode core by heating to cause germanium present in the core to diffuse into the cladding or aligning

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the cores of the few-mode fiber and LACDCF by launching the fundamental mode of the few-mode fiber while monitoring the modal content at the input of the LACDCF by a near field measurement device and aligning the output end of the bundle and the input of the LACDCF until a Gaussian mode field is obtained, in combination with the rest of the claimed limitations.

With regard to claims 19 and 20: These claims would be allowable over the prior art of record if rewritten in independent form including all of the limitations of the base claim and any intervening claims because they depend from a claim(s) with allowable subject matter.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- DiGiovanni et al (US 5,864,644) could be used instead of Fidric in the 103(a) rejection above.
- All of the following references teach couplers coupling different mode fibers in various ways and is pertinent to the state of the art at the time of applicant's invention: Ozeki (US 4,392,712), Bhagavatula (US 4,877,304), Newhouse et al (US 4,877,300), Daniel et al (US 5,355,426), Dumais et al (US 5,479,546), Craig et al (US 5,761,234), DiGiovanni et al (US 6,397,636 B1) (US 2004/0252946 A1), Craig et al (US 6,167,075), MacCormack et al (US 6,434,295 B1), Riis et al (US 6,840,687 B2), Bayart et al (US 2003/0128723 A1), Christensen et al (US

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2004/0091219 A1), Starodoumov (US 2004/0196537 A1), Skovgaard et al (US 2004/0247271 A1), Vakili et al (US 6,823,117 B2).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Lepisto whose telephone number is (571) 272-1946. The examiner can normally be reached on M-F 7:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

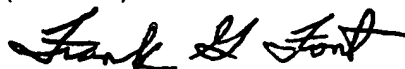
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Ryan Lepisto

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Date: 5/16/05



Frank Font

Supervisory Patent Examiner

Technology Center 2800